STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEM IN SMALL COMMERCIAL BUILDINGS NOT REQUIRING NFPA 13 FIRE SPRINKLER SYSTEMS BY OTHER CODES

NOTICE:

An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A, NFPA 13R.

Information on referenced publications can be found in Chapter 3 and Appendix B, of NFPA 13R.
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PREFACE

It is intended that this standard provides a method for those individuals required to install a sprinkler system for life safety and property protection. This standard assumes that one or more smoke detectors will be installed.

CHAPTER 1 GENERAL REQUIREMENTS

1.1* Scope

This standard deals with the design and installation of automatic sprinkler systems for protection against fire hazards in small commercial buildings not required by other codes to have an NFPA 13 system.

NOTE: NFPA 13 modified systems in commercial buildings may or may not be recognized for insurance credits.

1.2* Purpose

The purpose of this standard is to provide design and installation requirements for a sprinkler system to aid in the detection and control of fires in small commercial buildings and thus provide improved protection against injury, life loss, and property damage. A sprinkler system designed and installed in accordance with this standard is expected to prevent flashover (total involvement) in the room of fire origin, when sprinkled, or to improve the chance for occupants to escape or be evacuated.

SPFC 101.2.2 Permitting and Inspection The inspection or permitting of any building or plan by any jurisdiction under the requirements of this code shall not be construed in any court as a warranty of the physical condition of such building or the adequacy of such plan. No jurisdiction or any employee thereof shall be liable in tort for damages for any defect or hazardous or illegal condition or inadequacy in such building or plan, nor for any failure of any component of such building, which may occur subsequent to such inspection or permitting.

Nothing in this standard is intended to restrict new technologies or alternate arrangements, providing that the level of safety prescribed by the standard is not lowered.

ORDINANCE TO ADOPT FIRE SPRINKLER STANDARD CODES

An ordinance to adopt various standards as relating to the required installation of fire sprinkler systems in all new multi-family residential occupancies as per the National Fire Protection Association (NFPA) 13R and all new commercial buildings 3500 square feet in floor space and greater not requiring NFPA 13 fire sprinkler systems by other codes.

An ordinance to adopt various standards as relating to the required installation of fire sprinkler systems in all existing multi-family residential occupancies as per NFPA 13R and all existing commercial buildings 3500 square feet in floor space and greater not requiring NFPA 13 fire sprinkler systems by other codes, when the structure is being upgraded or renovated 50% or greater of the building's estimated value or size or when the buildings occupancy changes.

Section 1: WHEREAS, it is the desire of, the Mayor and Council of Ellijay, Georgia to adopt, in all aspects, the various standard codes relating fire sprinkler systems in multi-family residential occupancies per NFPA 13R and commercial buildings 3500 square feet in floor space or greater not requiring NFPA 13 fire sprinkler systems by other codes.

Whereas, the adoption of these codes is done to facilitate proper inspection activities by, the City of Ellijay relating to construction and maintenance of buildings within the corporate limits of said town and relating to public safety, health, and general welfare;

NOW, THEREFORE, BE IT ORDAINED by Ellijay Mayor and Council that the following codes are hereby adopted by reference as though they were copies herein fully:

> NFPA 13 Installation of Sprinkler Systems.

> NFPA 13R Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height.

> Standard for the installation of sprinkler systems in small commercial buildings not requiring NFPA 13 fire sprinkler systems by other codes.

Section 2: BE IT FURTHER ORDAINED by the Ellijay Mayor and Council that any matters in said codes, which are contrary to existing ordinances of the city, shall prevail.

Section 3: BE IT FURTHER ORDAINED that within said codes when reference is made to the duties of certain officials named therein that designated official of Ellijay, Georgia who has duties corresponding to those of the named official in said code shall be deemed to be the responsible official insofar as enforcing provisions of said code are concerned.

Section 4: BE IT FURTHER ORDAINED that this ordinance shall take effect and be in force from and after its passage.

1-3 DEFINITIONS

Approved- Acceptable to the "Authority Having Jurisdiction'

Authority Having Jurisdiction- The Authority Having Jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure on behalf of the City of Ellijay.

Cheek Valve- A valve that allows flow in one direction only.

Control Valve- An indicating valve employed to control (shut) a supply of water to a sprinkler system.

Design Discharge- Rate of water discharged by an automatic sprinkler, expressed in gallons per minute.

Dry System- A system employing automatic sprinklers that are attached to a piping system containing air under atmospheric or higher pressure. Loss of pressure from the opening of a sprinkler or detection of a fire condition causes the release of water into the piping system and out the opened sprinkler.

Dwelling Unit- One or more rooms arranged for the use of one or more individuals living together as in a single unit or for transient use such as hotel/motels. .

Fast Response Sprinkler- An automatic sprinkler that has been specifically listed fast response, NFPA 13.

Labeled- Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization acceptable to the "Authority Having Jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling manufacturer indicates compliance with appropriate standards or performance in a specific manner.

Listed- Equipment or materials included in a list published by an organization acceptable to the "Authority Having Jurisdiction"

NOTE: The means for identifying listed equipment may vary from each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled The "Authority Having Jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Multipurpose Piping Systems- Piping systems within an occupancy intended to serve both domestic and fire protection needs.

Shall- Indicates a mandatory requirement.

Should- Indicates a recommendation or that which is advised but not required.

Sprinkler-Automatic- A fire suppression device that operates automatically when its heat-activated element is heated to or above its thermal rating, allowing water to discharge over a specific area.

Standard- A document containing only mandatory provisions using the word "shall" to indicate requirements. Explanatory materials may be included only in the form of "fine print" notes, in footnotes, or in appendix.

Water flow Detector- An electric signaling indicator or alarms check valve activated by water flow in one direction only.

Wet System- A system employing automatic sprinklers that are attached to piping system-containing water and connected to a water supply, so that water discharges immediately from sprinklers opened by a fire.

1-4 (Reserved)

1-5 Piping

1-5.1 Piping or tube used in sprinkler systems shall be of the materials in Table 1-5.1 or in accordance with 1-5.2 through 1-5.5. The chemical properties, physical properties, and dimensions of the materials listed in Table 1-5.1 shall be at least equivalent to the standards cited in the table and designed to withstand a working pressure of not less than 175 psi.

Table 1-5.1
(Reference NFPA 13R)

1-5.2 Other types of pipe or tube may be used but only those listed for this service.

1-5.3 Whenever the word pipe is used in this standard, It shall be understood to also mean tube.

1-5.4 Pipe joined with mechanical grooved fittings shall be joined by a listed combination of fittings, gaskets, and grooves. When grooves are cut or rolled on the pipe they shall be dimensionally compatible within the fittings.

Exception: Steel pipe with wall thickness less than Schedule 30 (in sizes 8 inch and larger) or Schedule 40* (in *sizes less than 8 Inches) shall not be joined by fittings used with pipe having cut grooves.

1-5.5 Fittings used in sprinkler systems shall be of materials listed in Table 1-5.5 or in accordance with 1-5.7. The chemical properties, physical properties, and dimensions of the materials listed in Table 1-5.5 shall be at least equivalent to the standards cited in the table. Fittings used in sprinkler systems shall be designed to withstand the working pressures involved, but not less than 175-psi cold-water pressure.

Table 1-5.5
(Reference NFPA 13R)

1-5.6 Joints for the connections of copper tube shall be brazed

Exception: Soldered joints (95-5 solder metal) may be used for wet pipe copper tube

systems

1-5. 7 Other types of fittings may be used, but only those listed for this service.

1-6 System Types

1-6.1 Wet-Pipe Systems- A wet-pipe system shall be used when all piping is installed in areas not subject to freezing.

1-6.2 Provisions shall be made to protect piping from freezing in unheated areas:

A. Pipes in unheated attics shall be protected from freezing by stapling batt insulation paper side down creating a tunnel over all pipes before blown-in insulation is applied. Heavy mill plastic may be used in lieu of batt insulation.

B. Pipes in unheated attics in buildings not designed for blown in insulation shall be protected from freezing in a manner acceptable to the "'Authority Having Jurisdiction".

C. Sprinkler controls in unheated areas shall be protected from freezing by using hard wire heat cable and batt insulation.

Exception: Listed standard dry-pendant, dry upright or dry sidewall sprinklers may be extended into unheated areas not intended for living purposes.

Chapter 2 Working Plans, Design, Installation, Acceptance Test, and Maintenance

2-1 Working Plans and Acceptance Test.

2-1.1 Working Plans.

2-1.1.1 Working plans shall be submitted for approval to the "Authority Having Jurisdiction" before any equipment is installed or remodeled. Deviations from approved plans will require permission of the "Authority Having Jurisdiction".

2-1.1.2 Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor, made so that they can be easily duplicated, and shall show the following data:

a) Name of owner and occupant.
b) Location, including street address. c) Point of compass. d) Ceiling construction. e) Full height cross section. 1) Location of firewalls. g) Location of partitions.
h) Occupancy of each area or room.
i) Location and size of concealed spaces, attics, closets, and bathrooms.
j) Any small enclosures in which no sprinklers are to be installed.

k) Hydraulic calculations shall be provided with a 24-hour pressure chart, showing the high and low pressure in a 24-hour period. Calculations shall be formulated on the lowest pressure.
1) Make, manufacturer, type, heat-response element, .temperature rating, and nominal orifice size of sprinkler.
m) Temperature rating and location of high-temperature sprinklers. n) Number of sprinklers on each riser, per floor. o) Kind and location of alarm bells.
p) Type of pipe and fittings,
q) Type of protection for nonmetallic pipe.
- Nominal pipe size with lengths shown to scale.

Note: Where typical branch lines prevail, it will be necessary to size only one line.

- *Location and size of riser nipples.*

t) Type of fittings and joints and locations of welds and bends.
- *Types' and locations of hangers, sleeves, braces, and methods of securing sprinklers, where applicable.*
- *All control valves, check valves, drainpipes, and test connections.*

w) Underground pipe size, length, location, weight, materials, valve pits, and the depth at which the top of the pipe is laid below grade.
- *For hydraulically designed systems, the material to be included on the hydraulic data nameplate.*

y) Name and address of contractor.

2-1.2 Approval of Sprinkler Systems

2-1.2.1 The installer shall perform all required acceptance tests (see 2-1.3), complete the contractor's material and test certificate (see Figure certificate to the "Authority Having Jurisdiction"), prior to asking for the approval of the installation.

Figure 2-1.2.1
(Reference NFPA 13R)

2-1.2.2 When the "Authority Having Jurisdiction" desires to be present during the conducting of acceptance test, the installer shall give advance notification of the time and date the testing will be **performed.**

2-1.3 Acceptance Tests

2-1.3.1 Flushing of Underground Connections

2-1.3.1.1 Underground mains and lead-in connections to the system risers shall be flushed before connection is made to the sprinkler piping in order to remove foreign materials that may have entered the underground piping during the course of the installation. For all systems, the flushing operation shall be continued until the water is clear.

2-1.3.1.2 Underground mains and lead-in connections shall be flushed at the hydraulically calculated water demand rate of the system.

2-1.3.1.3 To avoid property damage, provisions shall be made for the disposal of water issuing from test outlets.

2-1.3.2* All systems shall be tested for leakage at 50 psi above maximum system design pressure.

Exceptions: When afire department connection is provided, hydrostatic pressure tests shall be provided in accordance with NAPA 13, Standard for the Installation of Sprinkler Systems.

2-2 Design and Installation

2-2.1. **Devices and Materials**

2-2.1.1* Only new sprinklers shall be employed in the installation of sprinkler systems. 2-2.1.2 Only listed or approved devices and materials as indicated in this standard shall be used in sprinkler systems.

2-2.1.3 Sprinkler systems shall be designed for a maximum working pressure of 16 psi

Exception: Higher design pressures may be used when all system components are rated for pressures higher than 160 psi

2.3 Water Supply.

2-3.1 Every automatic sprinkler system shall have at least one automatic water supply. When stored water is used as the sole source of supply, the minimum quantity shall equal the water demand rate times 30 minutes. (see 2-5.1.3)

2-3.2* The following water supply sources are acceptable:

a) A connection to reliable water works system with or without a booster pump, as required.
b) An elevated tank.
c) A pressure tank installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 22, Standard for Water Tanks for Private Fire Protection.
d) A stored water source with an automatically operated pump, installed in accordance with NFPA 20, Standard for the Installation of Centrifugal Fire Pumps.

2-3.2.1 A minimum of a 1 inch flow water meter shall be used if individual water meters are used.

2-3.3 Multipurpose Piping Systems

2-3.3.1 A common supply main to the building, serving both sprinklers and domestic uses, shall be acceptable when the domestic design demand is added to the sprinkler system demand.

Exception: Domestic design demand need not be added if provision is made to prevent flow on the domestic water system upon operation of sprinklers.

2-3.3.2 Sprinkler systems with non-fire protection connections shall comply with Section 5-6 of NFPA 13, Standard for the Installation of Sprinkler Systems.

2-4 System Components

2-4.1 Valves and drains.

2-4.1.1 When a common supply main is used to supply both domestic and sprinkler systems, a single control valve shall be provided to shut off both the domestic and sprinkler systems, a separate shutoff valve shall be provided, only for the domestic system.

Exception: The sprinkler system piping may have a separate control valve when supervised by one of the following methods:

a) Central station, proprietary, or remote station alarm service
b) Local alarm service that will cause the sounding of an audible signal at a constantly attended point, or
c) Locking the valves open.

2-4.1.2 Each sprinkler system shall have a 3/4 inch or larger drain and test connection with valve on the system side of the control valve, located above flow switch.

2-4.1.3 Additional 1/2 inch drains shall be installed for each trapped portion of a dry system that is subject to freezing temperatures.

2-4.3 Pressure gauges shall be provided to indicate pressures on the supply and system side of the main check valves.

2-4.4 Piping hangers and bracing methods shall comply with NFPA 13, Standards for the Installation of Sprinkler Systems and pipe manufacturer's specifications.

2-4.4.1 Sprinkler controls shall be located so to be accessible from outside the living areas. Minimum clear openings to controls shall be 2 inches below main valve, 2 inches above union on top, 5 inches on both sides measured from center of controls.

2-4.2.2 The sprinkler system shall be isolated from the domestic water system by not less than a dual action spring-loaded check valve assembly or two single action spring-loaded check valves in series.

2-4.4.3 Each sprinkler system shall have an adjustable resetting pressure relief valve with a maximum pressure rating of 175 psi located above the main drain valve.

2-4.5 **Sprinklers**

2-4.5.1 Listed fast response sprinklers acceptable to the "Authority Having Jurisdiction" shall be used inside occupied areas.

Exception: Fast response sprinklers shall not be used in dry systems unless specifically listed for that purpose.

2-4.5.2 Ordinary temperature rated sprinklers (135 to 170 degrees Fahrenheit) shall be installed where maximum ambient ceiling temperatures do not exceed 100 degrees Fahrenheit.

2-4.5.3 Intermediate temperature rated residential sprinklers 175 to 225 degrees Fahrenheit shall be installed where the maximum ambient ceiling temperatures are between 101 and 150 degrees Fahrenheit.

2--5.5.4 The following practices shall be observed when installing fast response sprinklers, unless maximum ambient ceiling temperatures are otherwise determined.

a) Sprinklers under glass or plastic skylights exposed to direct rays of the sun shall be of intermediate temperature classification.
b) Sprinklers in unventilated attics, shall be of intermediate temperature classification.
c) Mechanical, furnace, and water heater rooms shall have a 165 to 212 degree standard sprinkler head.

2-5.4.5.5 When fast response sprinklers are installed within compartment, as defined in 2-5.1.2.2, all sprinklers shall be from the same manufacturer and have the same heat response element, including temperature rating.

Exception: Different temperature ratings are permitted when required by **2-4.5.4.** 2-

4.5.6 Standard sprinklers shall be used in areas outside the dwelling unit.

2-4.5.7 Operated or damaged sprinklers shall be replaced with sprinklers having the same performance characteristics as the original equipment.

2-4.5.8 When nonmetallic ceiling plates (escutcheons) are used, they shall be listed. Escutcheon plates used to create a recessed or flush type sprinkler shall be part of the listed sprinkler assembly.

2-4.5.9 Painting and Ornamental Finishes

2-4.5.9.1 Sprinkler frames may be factory painted or enameled as an ornamental finish in accordance with 2-4.5.9.2, otherwise, sprinklers shall not be painted and any sprinklers that have been painted, except those with factory applied coatings, shall be replaced with new listed sprinklers.

2-4.5.9,2* Ornamental finishes shall not be applied to sprinklers by anyone other than the sprinkler manufacturer, and only sprinklers listed with such finishes shall be used.

2-4.6 Local water flow alarms shall be provided on all sprinkler systems (located outside) and shall be connected to the building fire alarm system, when provided.

2-4.6.1 The power to the alarm switch shall come from an essential service circuit breaker acceptable to the "Authority Having Jurisdiction".

2-5 System Design

2-5.1 Design Criteria-Inside Structure

2-5.1.1 The system shall provide a discharge of not less than 18 gpm to any single operating sprinkler and not less than 13 gpm per sprinkler to the number of design sprinklers, but not less than the listing of the sprinkler(s).

Exception: Design discharge for sprinklers installed in accordance with Exception No. *2 of 2-4.5.1* ***shall he in accordance with the sprinkler listing criteria.***

2-5.1.2* Number or Design Sprinklers

2-5.1.2.1 The number of design sprinklers shall be four (4).

2-5.1.2.2 The definition of compartment for use in 2-5.1.2.1 to determine the number of design sprinklers, is a space that is completely enclosed by walls and a ceiling. The compartment enclosure may have openings to an adjoining space if the openings have a minimum lintel depth of 8 inches from the ceiling.

2-5.13 The water demand for the system shall be determined by multiplying the design discharge of 2-5.1.1 by the number of design sprinklers of *2-5.1.2.*

2-5.1.4 Sprinkler Coverage

2-5.1.4.1 Fast response sprinklers shall be spaced so that the maximum area protected by a. single sprinkler does not exceed 144 square feet.

2-5.1.4.2 Spacing of sprinklers heads *to* be in accordance with the manufacturer's specifications, not to exceed 16 feet X 16 feet for pendent and not to exceed 16 feet X 20 feet for horizontal sidewalls.

2-5.1.4.3 The maximum distance between sprinklers with a compartment shall be 8 feet.

2-5.1.5 The minimum operating pressure of any sprinkler shall be in accordance with the listing information of the sprinkler and shall provide the minimum flow rates specified in 25.1.1.

2-5.1.6 Application rates, design areas, areas of coverage, and minimum design pressures other than those specified in 2-5.1.1, 2-5.1.2, 2-5.1.4 and 2-5.1.5 may be used with special sprinklers that have been listed for such specific installation conditions.

2-5.1.6.1 All systems shall be flow verified by a physical flow at the highest elevation, worst condition, and using orifices of sprinkler heads called for in the hydraulic calculations. Installer shall use a graduated container acceptable to the "Authority Having Jurisdiction" for this test.

2-5.1.7 Position of Fast Response Sprinklers

2-5.1.7.1 Pendent and upright sprinklers shall be positioned so that the deflectors are within l to 4 inches from the ceiling. Special residential sprinklers shall be installed in accordance with the listing limitations.

2-5.1.7.2 Sidewall sprinklers shall be positioned so that the deflectors are within 4 to *41/2* inches from the ceiling.

2-5.1.7.3 Sprinklers shall be positioned so that the discharge pattern and the response time are not unduly affected by obstructions such as ceiling slope, beams, or light fixtures.

2-5.2 The design discharge, number of design sprinklers, demand of the system, sprinkler coverage, and position of sprinklers for areas to be sprinkled outside the structure shall comply with specifications in NFPA 13, Standard for the Installation of Sprinkler Systems.

Exception Number 1: When compartment areas of 500 square feet or less by 30- minute fire-rated construction, and the area is protected by standard or quick response sprinklers not exceeding 130 square feet per sprinkler, the system demand may be limited to the number of sprinklers in the compartment area, but not less than a total of four sprinklers. Openings from the compartments need not be protected provided such openings are provided with a lintel at least 8 inches in depth and the total area of such openings do not exceed 50 square feet for each compartment. Discharge density shall be appropriate for the hazard classification as determined by NFPA 13, Standard for the Installation of Sprinkler Systems.

Exception Number 2: Lobbies, in other than hotels and motels, foyers, corridors, and halls outside the structure, with flat, smooth ceilings and not exceeding 10 feet in height, may be protected with residential sprinklers, with a maximum system demand of four sprinklers.

2-5.3 Piping shall be sized in accordance with hydraulic calculation procedures to comply with NFPA 13, Standards for the Installation of Sprinkler Systems.

2-6 Sprinklers shall be located in areas as required by NFPA 13, except sprinklers will not be required in combustible attics, crawl spaces, blind concealed combustible spaces, freezers, walk-in coolers, docks, canopies and overhangs.

2-7 The owner is responsible for the condition of a sprinkler system and shall keep the system in normal operating condition.

2-7.1 The sprinkler system shall be serviced and maintained as specified in NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

2-8 There shall be a supply of spare sprinkler heads and sprinkler wrench positioned near the sprinkler system riser. Heads shall be kept in a protective box designed to house sprinkler heads.

2-8.1 A minimum of 6 spare heads shall be supplied. Sprinkler heads shall be of same design and temperature rating.

Chapter 3
Referenced Publications

3.1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The latest edition of each referenced code is applicable.

3.1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 13, Standard for the Installation of Sprinkler Systems.

NFPA 13D, Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Mobile Homes.

NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height.

NFPA 20, Standard for the Installation of Centrifugal Fie Pumps.

NFPA 22, Standard for Water Tanks for Private Fire Protection.

NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.

NFPA 72, National Fire Alarm Code.

NFPA 101, Life Safety Code.

NFPA 220, Standard on Types of Building Construction.